

CLAIMS

1. A ceramic filter comprising: a porous body having two end surfaces and an outer peripheral surface and having a plurality of main flow passages for a fluid to be purified which penetrate from one end surface to other end surface and which are partitioned from one another via partition walls; and filtration membranes provided on inner wall surfaces of the main flow passages,

the fluid to be purified that flows into the filter from opening portions in one end surface of the main flow passage being allowed to permeate the filtration membranes and an inside of the porous body to be thereby purified, the fluid being then taken out as a purified fluid from the outer peripheral surface of the porous body, or

the fluid to be purified that flows into the filter from the outer peripheral surface of the porous body being allowed to permeate the inside of the porous body and the filtration membranes to be thereby purified, the fluid being then taken out as a purified fluid from at least opening portions in one end surface of the main flow passage,

wherein cross section shapes of the plurality of main flow passages, in a direction perpendicular to a flow direction of the fluid to be purified or the purified fluid, are aligned in rows with a predetermined pattern,

a specific partition wall part, among the partition walls, is positioned between the rows of predetermined main

flow passages (first specific main flow passages) disposed in the vicinity of each other, the cross section shape of the specific partition wall part, in the direction perpendicular to the flow direction of the fluid to be purified or the purified fluid, is so formed as to be encompassed by a shape defined by two parallel lines apart at a specified distance from each other,

the cross section shapes of the first specific main flow passages, in the direction perpendicular to the flow direction of the fluid to be purified or the purified fluid, are formed into polygonal shapes equivalent or superior to heptagonal shapes arranged so that predetermined sides (reference sides) facing each other via the specific partition wall part constitute the two parallel lines, and

assuming that sides crossing opposite ends of the reference side are second and third sides, a side crossing an end of the second side opposite to the reference side is a fourth side, and a side crossing an end of the third side opposite to the reference side is a fifth side, θ_1 , θ_2 , θ_3 , and θ_4 (wherein the θ_1 , θ_2 , θ_3 , and θ_4 indicate an angle (θ_1) formed by the reference side and the second side, an angle (θ_2) formed by the reference side and the third side, an angle (θ_3) formed by the second and fourth sides, and an angle (θ_4) formed by the third and fifth sides, respectively) are within a range of 110 to 160°, and a length (A) of the reference side and a maximum distance (B) between the fourth and fifth sides satisfy a requirement of

$$0.3B \leq A \leq 0.7B.$$

2. The ceramic filter according to claim 1, having: two or more sets of parallel lines each set comprising two parallel lines.

5 3. The ceramic filter according to claim 1 or 2, wherein the cross section of the porous body, in the direction perpendicular to the flow direction of the fluid to be purified or the purified fluid, has a maximum diameter of 70 mm ϕ or more.

10 4. The ceramic filter according to any one of claims 1 to 3, wherein the specific partition wall part is provided with rows of predetermined main flow passages (second specific main flow passages) whose opposite end-surface openings are plugged, slit-like auxiliary flow passages are
15 formed in portions including the outer peripheral surface of the porous body so that the second specific main flow passages communicate with an external space,

the fluid to be purified that flows into the filter from the opening portions in the one end surface of the
20 main flow passage is allowed to permeate the filtration membranes and the inside of the porous body to be thereby purified, and the fluid is taken out as the purified fluid from the outer peripheral surface of the porous body and outlets of the auxiliary flow passages, or

25 the fluid to be purified that flows into the filter from the outer peripheral surface of the porous body and the outlets of the auxiliary flow passages is allowed to

permeate the inside of the porous body and the filtration membranes to be thereby purified, and the fluid is taken out as the purified fluid from at least the opening portions in the one end surface of the main flow passage.

- 5 5. The ceramic filter according to claim 4, wherein an arrangement pattern of cross section shapes of the rows of second specific main flow passages and the rows of main flow passages other than the second specific main flow passages, in the direction perpendicular to the flow direction of the fluid to be purified or the purified fluid, is a repeated pattern including two to eight rows of main flow passages other than the second specific main flow passages, which are arranged subsequently to one row of second specific main flow passages.
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